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ments of Patrizi, Hill, Mosso and others are reviewed. The internal organs, stomach, kidneys, etc., may be in full activity during profound sleep. As regards the nervous system the inactivity is found in the centers rather than in the nerve and cord. The brain is in a collapsed, pale condition. The special senses may any of them be active, while walking, talking, and other movements are not incompatible with sleep. Even the brain may be active in some of its parts.

The various theories as to the cause of sleep are discussed and criticised. The vasomotor theories find sleep to be caused directly by the withdrawal of the blood from the brain, or indirectly by the relaxation of tone in the vasomotor center controlling the skin vessels, producing dilatation of the latter and anæmia at the centers. The chemical theories attribute sleep to the impoverishment of oxygen in the brain, or to the poisonous presence of carbonic acid or of leucomaines. Some recent histological theories of sleep explain it by assigning certain amoeboid characters to the cerebral cells or to the cells of the neuroglia, the retraction of the ramifications of these cells resulting in isolation and inactivity of the nervous elements. In place of any of these theories the author herself very naively substitutes a psychological theory based upon the formula: Sleep is the resting time of consciousness. Hence we notice that those in whom consciousness is feebly developed, savages, infants, less cultured adults, require more sleep than others.

Under pathology, the writer treats of insomnia, syncope, excessive sleep, hibernation, narcolepsy, catalepsy, hypnosis, latah and somnambulism. In all of these the discussion is brief and presents nothing striking. Under hygiene, attention is called to the dangers of too much sleep to persons of all ages. In children it develops the vegetative life of the organism at the expense of the central nervous system. In boys and girls it is apt to lead to albuminuria. In adults it enfeebles the brain. Likewise, the half-waking state, hypnosis, the use of alcohol or narcotics, are all injurious, as they tend to produce an enfeebled consciousness. We should rise late in winter and early in summer. In the case of

children perfect uniformity in the time of retiring and rising should be avoided.

Under the psychology of sleep, dreams are treated at some length, as to their classification, causes and peculiarities. The strangeness of dreams, as well as the criminal nature that they sometimes assume, is accounted for by their atavistic character. In dreams our personal, fully developed consciousness is asleep, while latent tendencies transmitted by our farthest ancestors tend to revive. "A good and peaceful man may awake in horror with forehead bathed in sweat from a dream in which he has been transported into some strange and antipathetic environment in which he has committed a barbarous and cruel deed, not altogether abnormal, but fully possible in the far past of humanity."

G. T. W. PATRICK.

UNIVERSITY OF IOWA.

SOCIETIES AND ACADEMIES.

NEW YORK ACADEMY OF SCIENCES—SECTION
OF BIOLOGY—MEETING OF JAN-
UARY 10, 1898.

PROFESSOR OSBORN spoke as follows on the Origin of the Mammalia: Huxley's hypothesis (1880) deriving the Hypotheria or Promammalia from ancient Amphibia contrasts with Cope's (1884), which substituted carnivorous reptiles of the Pelycosaur type included in his order Theromora. Baur (1886) placed the Theromora as a parallel phylum with the mammalia springing from Sauromammalia of the Permian. Osborn (1888) proposed the Protodonta as archaic mammals transitional to reptiles, and later (1893) adopted Baur's views as to the Theromora. More recently Baur has removed the Pelycosauria from the Theromora entirely, and thus speculation by the late Professor Cope, Baur and Osborn as to the origin of mammals turns back to the true Theromora, namely, the *Dicynodontia* and *Theriodontia* of Owen, a group which Professor H. G. Seeley has described in his numerous memoirs. Among these Permian reptiles of South Africa we find a remarkable assemblage of characters which comparative anatomy and paleontology have led us to anticipate in the hypothetical promammal. Osborn (1888 and 1893) described the probable

dental and mandibular characters of the promammal, and from the investigations of Baur, Howes, Hubrecht, Beddard, Albrecht and others are derived, in the skeleton and soft parts, other characters which are largely amphibian.

A comparison of the *Dicynodontia*, *Theriodontia* and *Gomphodontia* (Seeley) shows that, while widely separated in dental characters, these reptiles are closely united in numerous osteological characters, which, in turn, distinguish them from all other reptiles, the most striking regions being the palate, zygomatic arch, expanded squamosal and correlated reduction of the quadrate, and the complex structure of the occipital condyle. Owen's definitions are too narrow for this group, which appears to be embraced only in Cope's larger definition of the *Theromora*. As is well known, the *Dicynodontia* throughout the skeleton abound in mammalian characters, and in the skull exhibit a combination of special adaptations to the greatly developed canine teeth with persistent reptilian and promammalian characters. The term *Theriodontia* should be restricted, according to Owen's original definition, to carnivorous types, such as *Cynognathus*, with triconodont molar teeth and typical promammalian dental formula. The characters of the skull, teeth, vertebræ, pectoral and pelvic arches and limbs on the one side show the affinities of these animals to the *Dicynodonts*, and, upon the other, make them appear prophetic of the Jurassic *Triconodonta*. The Triassic *Protodonta* are quite as primitive in dentition, but different so far as known in that the jaw consists of a single bone. The third group, or *Gomphodontia*, Seeley, embraces herbivorous types with grinding teeth of multitubercular and rudely tritubercular pattern. The latter fact is of great significance in the support it apparently lends to Osborn's hypothesis that the multituberculates are of trituberculate origin. In cranial characters these animals are as similar to the *Theriodonts* as they are dissimilar in dental characters, and since they include the genus *Tritylodon*, which was formerly placed among the *Multituberculata*, it appears possible that we have here a phylum more or less remotely related to the very ancient Mesozoic phylum of *Multituberculata*.

Summing up the *Theriodont* characters we find promammalian resemblances both in the form and formulæ of the teeth; in the terminal position of the anterior nares and structure of the palate; in the posterior expansion of the nasals; in the main infratemporal or zygomatic arch; in the great development of the squamosal and reduction of the quadrate; in the paired occipital condyles; in the intercentra of the cervical vertebræ; in the suturally united cervical ribs; in the intervertebral anterior dorsal ribs; in the *Monotreme* type of scapular arch (excepting, perhaps, the epicoracoid united by suture with metacoracoid); in the prescapular spine; in the powerful deltoid crest, large entepi- and ectepicondyles and entepicondylar foramina of the humerus. The limb and pelvic structure is evidence of a musculature similar to that of the hypothetical *Promammalia*, and of a body well raised above the ground and quadrupedal in position. As persistent reptilian characters may be cited the separate prefrontals, postfrontals and postorbitals and separate quadrate, which, according to Albrecht, is a reversal character in the *Mammals*; the separate transversum; distinct prevomer and complete pterygoquadrate arcade; the prominent basioccipital element; the separate elements of the lower jaw, and finally as adaptive or specialized characters are the several peculiar features in the back, skull and other parts of the skeleton. In conclusion, it appears that these true *Theromora* have the geological age required for the ancestors of the *Mammalia*. They are the only class of reptiles which exhibit mammalian affinities. They anticipate in the most surprising manner the dental structure of the ancient *Triconodonta* and *Multituberculata*. A most striking difference is found in their size, which far exceeds that of the oldest undoubted *Mammals*. This and certain specializations of structure bar any of the known *Theromora* from the ancestry of the earliest mammals, but do not preclude the existence of very small, unspecialized forms, which may have given rise to the oldest mammalian types. The existence of Amphibian structures, as observed by Hubrecht and others, in the placentation and soft anatomy of the mammals may be explained by the supposition that these *Theromora* retained certain Amphib-

ian structures from the ancestral Stegocephalia, which they transmitted to their descendants. The paired occipital condyle, however, upon which Huxley laid so much emphasis, is probably of secondary origin in this group, and not of direct derivation from the paired condyle of the Amphibians.

Dr. F. M. Chapman described the various types of vegetation and the altitudinal distribution of birds along the lines of the railroads running from the coast at Vera Cruz into the tablelands of the interior.

Professor F. E. Lloyd described the abnormal assimilative leaves produced by hypertrophy of scales on shoots of *Pinus ponderosa* after pruning of staminate shoots. The scales which subtend the fascicles so-called are the morphological equivalents of leaves.

Similar abnormal leaves are produced from the stump after cutting down the trees in certain species of Pine (*e. g.*, *Pinus rigida*). These have been regarded as identical with the primary leaves of the seedlings. The comparison of the hypertrophied scales under discussion with the primary leaves of species of Pine studied by Daguillon shows that they differ in certain details, and that they approach in structure to the *Abies* type of leaf which has peripheral ducts and double vascular bundles. The leaf of *Pseudotsuga* comports with this type, and the speaker suggested that the Pines may have been derived phylogenetically from a generalized form represented best among living genera by the genus *Pseudotsuga*, which combines the characters of *Abies* and *Picea* to a considerable degree. The exsert bracts are intermediate between these two genera, *Abies* and *Picea*, while the large seminiferous scales correspond more nearly to *Abies*.

These abnormal leaves of *Pinus ponderosa* must be regarded as atavistic, and are believed to be of pronounced value in the study of the phylogeny of the group.

GARY N. CALKINS,
Secretary of Section.

NEW YORK ACADEMY OF SCIENCE—SECTION
OF GEOLOGY, JANUARY 17, 1898.

THE meeting opened with a paper by Mr.

Arthur Hollick, entitled 'Further Notes on Block Island; Geology and Botany.' Mr. Hollick gave a summary of his work done on Block Island in July, 1897, and particularly of his success in tracing eastward from Long Island the Amboy clays which had previously been determined by paleontological evidence on Staten Island, Long Island and Martha's Vineyard. Something like fifteen species of Middle Cretaceous flora, nine of them typical of the Amboy clay, have been found. Mr. Hollick then classified the existing flora of the Island physiographically into that of the hills, peat bogs, sand dunes and beaches, salt marshes and salt water. In the course of his work he added to the already published lists something like twenty-four new species, though it is not considered that this, by any means, completes the list of possible species that might be found in the spring. The flora, as a whole, is distinctly that of a morainal country, and its nearest analogue is that of Montauk Point.

Mr. Hollick then offered some suggestions to account for the present peculiar flora of the Island, and particularly for the absence of certain species that would be expected, and showed that two features are to be taken into consideration, the geological and the human. Block Island is the only part of the terminal moraine along the New England coast which does not have accompanying the moraine a certain amount of plain land, which would naturally allow a variety in the flora. It is presumable that Block Island also has been practically separated from the rest of the continent by a deep channel of more than twenty fathoms for a considerable time, and that even before the last depression of land the Island was connected to the mainland merely by a small peninsula, and hence the diversity of the flora as compared with the continent, because of the length of separation. The speaker also mentioned extensive archæological discoveries on the west shore of the Island, and gave a list of the shells and implements discovered in several of the kitchen middens, and also of the bones of animals brought to light in the old fireplaces in the sand dunes. He made particular mention, also, of the great number of *Littorina*, the common periwinkle of Europe, which has never before

been announced from Block Island. The paper was discussed by Professors Lloyd and Martin.

The second paper of the evening was by the Secretary, entitled 'Scientific Geography in Education.' The speaker brought out the point that geography work may be classified into three divisions—that for the common schools, the secondary schools and the universities—and outlined briefly a few suggestions as to how the subject-matter might be treated scientifically in each of the groups, and the dependence of each group upon the others. He paid particular attention to the difficulties of securing scientific work in geography in the grade schools, and to the fact that the present work is extremely unsatisfactory in most of our schools, probably because of the lack of inspiration, owing to the neglect of the subject hitherto in universities of the country. The paper was illustrated by a series of cheap and easily procurable maps that may be used for scientific geography work in either of the groups mentioned.

The meeting then closed with a few remarks by the Chairman in reference to the famous classic entitled 'Lithographiæ Wirceburgensis ducentis lapidum figuratorum, a potiori insectiformium prodigiosis imaginibus exornatæ, specimen primum,' written by Dr. Beringer and published in Würzburg in 1726. Professor Kemp summarized the work of the author in attempting to explain a great collection of pseudo-fossils from a theological standpoint, the fossils having previously been made by some practical jokers and buried in the rocks for the author to find.

RICHARD E. DODGE,
Secretary.

SUB-SECTION OF ANTHROPOLOGY AND PSYCHOLOGY.

AT the regular meeting of the New York Academy of Sciences at 64 Madison Avenue, Monday evening, January 24th, fourteen new names were proposed for membership. This is evidence of the increased interest being awakened in the Academy by the active efforts of President Stevenson. The hope was expressed that the number of members might soon be raised to five hundred.

The principle paper of the evening was presented by Mr. E. L. Thorndike, of Columbia University. He gave an account of a long series of interesting experiments on comparative psychology. These experiments were made upon cats, chickens, dogs, monkeys and other animals and were supplemented by the experience of professional animal trainers.

Cats were placed in boxes with doors so arranged that they could be opened from the inside in various ways, in one set of experiments by pressing a latch, in another by pulling a cord, by pulling a hook attached to a cord, or by turning a button. Again the arrangement was more complicated and two or three separate movements had to be combined in order to release the door and let the animal out to reach the fish placed outside the cage. Curves were given showing the rate at which the kittens learned the various tricks, the time taken to get out becoming gradually shorter.

The trick was always learned by accident; one lucky hit would prepare the way for another. There was no trace of rational inference. Seeing another animal do the trick a hundred times was no help. Nor was it possible to teach the trick by taking the kitten's paw and putting it on the latch and so opening the door, no matter how often it was repeated.

A habit once formed artificially will overpower natural instincts. A chicken that had been compelled to jump from a box to the floor in a roundabout way by a cardboard placed in its way felt unable to jump down to its food directly when the card was taken away.

The second paper was presented by Mr. H. I. Smith, of the Museum of Natural History. He gave an account of the archæological work which he did in British Columbia during the summer. He was the third member of the Jesup expedition, with Dr. Boas and Dr. Farrand. The work of the expedition has already been described in SCIENCE.

Dr. Livingston Farrand, of Columbia University, presented a brief report of the meeting of the American Psychological Association held at Cornell during the holidays.

CHARLES B. BLISS,
Secretary.

CHEMICAL SOCIETY OF WASHINGTON.

At the fourteenth annual meeting, held January 13th, the following officers were elected for the ensuing year, viz.: President, Henry N. Stokes; Vice-Presidents, Peter Fireman, H. Carrington Bolton; Secretary, William H. Krug; Treasurer, W. P. Cutter; Executive Committee, the above and Charles E. Monroe, E. A. de Schweinitz, Wirt Tassin, W. F. Hillebrand.

V. K. CHESNUT,
Secretary pro tempore.

BIOLOGICAL SOCIETY OF WASHINGTON—285TH MEETING, SATURDAY, JANUARY 15.

THE major part of the evening was devoted to 'A Symposium on Recent Additions of Our Knowledge of the Cell,' the subject being introduced by Dr. Frank Baker, who gave a brief *résumé* of the successive discoveries in regard to the structure of the cell, touching on the theories of the alveolar and filar structures of the cytoplasm and dwelling at some length on the changes which take place in the nucleus during cell division.

Messrs. David G. Fairchild, Herbert J. Webber and Walter T. Swingle, who followed, presented the topic chiefly from a botanical standpoint, showing that the processes of nuclear and cell division were much more varied in plants than among animals, and might be very different, even taking place without the presence of a centrosome.

F. A. LUCAS,
Secretary.

BOSTON SOCIETY OF NATURAL HISTORY.

THE Society met December 15th, one hundred and five persons present.

Professor W. M. Davis, with the aid of a series of lantern slides, gave a graphic account of excursions from the Atlantic to the Pacific. Some of the prominent physiographic features of parts of New England, Niagara, the Lake Superior Region, the Lake of the Woods, Lake Simcoe, the Black Hills, the Canadian Rockies and portions of the country along the Northern Pacific Railroad were described and illustrated.

A general meeting was held January 5th, forty-two persons present.

Mr. Frank Russell read some notes upon the Athabaskan Indians, as observed in the neighborhood of the Great Slave Lake, on the Barren Ground of Canada. The men devote themselves to hunting, traveling in canoes and on snow shoes; the women are hard workers and, in addition to all the household duties, prepare the skins and make the garments. Personally the men are more cleanly than the women. Tattooing is not now practiced, and, under the influence of the Roman Catholic missionaries, polygamy has been abandoned; the Athabascans are Christians and Catholics. Mr. Russell also described many Athabaskan songs, their music, the methods of camp making, and the celebration at Easter, and closed with a series of lantern views illustrating the physical type of the tribe, their dwellings and some of their habits and customs.

Mr. John Murdoch said that the canoes, as shown by Mr. Russell, were similar to those used on the Yukon.

SAMUEL HENSHAW,
Secretary.

NEW BOOKS.

Text-book of Physical Chemistry. CLARENCE L. SPEYERS. New York, D. Van Nostrand Co. 1897. Pp. vii+224. \$2.25.

The Mathematical Theory of the Top. FELIX KLEIN. New York, Charles Scribner's Sons. 1897. Pp. 74.

A Short Handbook of Oil Analysis. AUGUSTUS H. GILL. Philadelphia and London, J. B. Lippincott Co. Pp. 139.

Chapters on the Natural History of the United States. R. W. SHUFELDT. New York, Studer Brothers. 1897. Pp. 472+Index.

A Primer of Psychology. EDWARD BRADFORD TITCHENER. New York and London, The Macmillan Company. 1898. Pp. xvi+314. \$1.00.

A Description of Minerals of Commercial Value. D. M. BARRINGER. New York and London, Chapman & Hall, Ltd. 1897. Pp. 168.

A. Ecker's and R. Wiedersheim's Anatomie des Frosches. Revised by ERNST GAUPP. Braunschweig, Friedrich Vieweg und Sohn. 1896-7. Pp. xiii+229 and ii+234.